



Agilent in the Life Sciences

TOOLS FOR DISEASE RESEARCH, DRUG DISCOVERY, TOXICOLOGY, FOOD TESTING, AND MORE

The study of life—from microorganisms to humans—involves a wide range of disciplines. These include a growing list of specializations and new interdisciplinary fields. Together they aim to increase our understanding of life, reduce suffering, and improve health.

Agilent provides a wide range of tools to help researchers explore the mechanisms of disease and health, drug discovery and development, agriculture, biofuels, and toxicology, to name a few disciplines. Customers include global pharmaceutical corporations, biotech companies, government labs, and academic researchers.

The life sciences include the following:

Integrated biology is study of multiple biological disciplines to achieve better understanding of how diseases and health work. Disciplines include genomics, proteomics, metabolomics, and transcriptomics. Agilent makes a wide variety of instrumentation to perform these types of experiments, including chromatography and mass spectrometry systems, DNA microarrays, sequencing tools, PCR solutions, and reagents. Agilent is also a leading developer of bioinformatics software needed to integrate these complex, different types of data.

Genomics is the study of all the genes in a biological sample. Agilent is a leading supplier of microarrays used to study gene expression (that is, which genes are switched on or off), gene regulation, copy number variations, and changes known as single nucleotide polymorphisms. Agilent is also a major supplier of tools to streamline DNA sequencing.

Proteomics is the study of all the proteins in a biological sample, to look for correlations with various disorders. Agilent is a leading provider of liquid chromatography and mass spectrometry systems, software, and consumables for protein identification, characterization, and quantification.

Metabolomics is the study of metabolites found in cells. Agilent GC/MS and LC/MS systems and software have become popular in the metabolomics community to detect and measure the very large numbers of these compounds and interpret the results. Agilent also offers libraries of metabolite chemical compositions, helping researchers achieve better, faster results.

Transcriptomics is all about assessing global gene expression in response to environmental stress, genetic perturbations, or cell lifecycle. Changes in gene expression or in miRNA levels can help explain the functional behavior of the system for basic research, identification of new drug targets or discovery of biomarkers. Agilent provides researchers in this field with microarrays, reagents, and consumables.

Pharmacology, the science of drugs, is an increasingly complex field. Throughout the value chain—from drug discovery research through manufacturing finished products—pharmaceutical and biopharmaceutical companies rely on Agilent instruments and software. Chromatographs, mass spectrometers, and nuclear magnetic resonance systems are popular instruments in pharmaceutical labs. Agilent is the world’s top provider of compliance services in regulated laboratory environments.

LIFE SCIENCE PRODUCTS AND TECHNOLOGIES

Agilent leads the market in **target enrichment**, a key component of next-generation sequencing (reading strands of DNA to determine the precise order of the base nucleotides.) The company’s [SureSelect and HaloPlex](#) platforms enable researchers to choose specific segments of a genome for deeper analysis—avoiding the time and expense involved in sequencing the whole thing.

Agilent also leads the market in **array-comparative genomic hybridization**, a high-resolution technique for detecting genomic variations. Array CGH is typically used to compare the DNA of a particular individual against a reference sample. Agilent offers a complete [array CGH solution](#) for mapping structural variations associated with developmental abnormalities, cancer and its progression, susceptibility to disease, and differing responses to treatment.

Mutagenesis, a way of modifying DNA to engineer desired mutations, allows researchers to modulate protein activity and characterize structure/function relationships, which enriches the understanding of basic cellular processes and disease mechanisms. Better understanding, in turn, promotes the discovery of new therapies for complex diseases and the unearthing of new ways to increase crop yields for a growing global population. Agilent’s [mutagenesis products](#) make it easy for scientists to achieve accurate, reliable results in the shortest possible time.

Gene-expression microarrays tell researchers which genes in a cell are turned on or off. This enables them to compare the expression patterns of healthy cells to those of cancer cells, for example. Researchers study gene expression to identify early warning signs of diseases, devise new therapeutics, and even investigate which drugs could work best for certain patients. [Agilent’s gene-expression microarrays](#), prized for high performance and reliability, provide scientists with a flexible, affordable platform for their gene-expression studies.

QPCR (quantitative polymerase chain reaction) is a technique used to amplify and quantify a specified molecule of DNA for either basic research or diagnostic purposes. Agilent’s prep-to-analysis solutions include fully integrated reagent kits, instruments and software. Used together, they give researchers the best sensitivity, specificity and speed.

Fluorescent in situ hybridization, or FISH, is a technique used in biomedical research to show the presence or absence of specific DNA sequences—sequences that may, for example, indicate cancer. Although Agilent is a relatively new entrant in this market, our [SureFISH](#) assays provide higher resolution and faster hybridization than competing technologies.

Liquid chromatography is a method of separating compounds within a liquid sample so they can be identified and quantified. The method is one of the most important tools for the life sciences because of its ability to analyze large, fragile biomolecules such as proteins, as well as chemical analysis.

Liquid chromatography/mass spectrometry is an analytical technique used to identify and quantify the compounds in a sample by determining the molecular weight of intact molecules and their fragments. LC/MS is an integral part of drug development and disease research. Agilent solutions include single quadrupole, triple quadrupole, time-of-flight, and quadrupole time-of-flight product families. High-performance systems incorporate revolutionary iFunnel technology to achieve unprecedented sensitivity. MassHunter software enables method set up, data acquisition, and processing in a single, intuitive package.

Gas chromatography/mass spectrometry is traditionally used in analytical chemistry applications such as food-safety testing and environmental analysis, is assuming a growing role in the emerging field of metabolomics (the study of all the metabolites in a biological sample) a promising source of biomarkers for many widespread illnesses. In GC, the sample is vaporized and separated into its individual components, and molecular weights are determined by the MS. Agilent is *the* global leader in GC and GC/MS.

Electrophoresis solutions from Agilent—the first company to commercialize a lab-on-chip system—include the Bioanalyzer, the category’s clear leader. Microfluidics technology enables the separation of minute amounts of DNA, RNA, and proteins. The Bioanalyzer has flow cytometry applications and is the industry standard for RNA QA/QC and nucleic acid QC in next-generation sequencing. The system is also used to screen for genetically modified food. Agilent also offers high throughput and ease of use with the TapeStation automated electrophoresis system and ready-to-use ScreenTape consumables. Agilent’s capillary electrophoresis systems are extremely versatile in nucleic acid and protein separations.

Bioinformatics enables scientists to interpret complex biological data. Agilent’s suite of bioinformatics solutions includes the widely used and highly regarded GeneSpring platform, which spans applications in gene expression, genotyping, copy number variations, metabolomics and proteomics.

Lab informatics systems from Agilent support the diverse needs of laboratories in the generation, collection, archiving, and reporting of laboratory data. The Agilent OpenLAB family encompasses instrument control and data systems, electronic lab notebook, and enterprise content management for organizations ranging from a single lab through a far-flung global enterprise.

X-ray crystallography solutions from Agilent employ single crystal X-ray diffraction (SC-XRD) in which an X-ray beam is directed at a crystal. From the positions and intensities of the diffracted beams the molecular structure is determined. SC-XRD can be applied to proteins enabling researchers to generate accurate models and design specially targeted drugs. The Agilent SuperNova and PX Scanner offer all of the crystal screening and structure determination tools required for the modern structural biology lab.

Lab automation solutions from Agilent provide innovative liquid-handling and microplate management instruments, systems and accessories meeting the high throughput demands of life science laboratories in pharmaceutical, biotech, and genomic research. The implementation of automation provides researchers higher throughput, improves data reproducibility and lowers variability. The latest additions to the portfolio include the BenchBot robot, a new a mid-sized microplate handler and the Agilent Bravo AssayMAP platform. The Bravo AssayMAP extends the capabilities of Agilent’s Bravo Automated Liquid

Handling Platform with an accurate, reliable, reproducible solution for microscale protein sample separation and purification.